

AN ROINN OIDEACHAIS

Write your Examination Number here

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LEAVING CERTIFICATE EXAMINATION, 1991

35904

H1

BIOLOGY—ORDINARY LEVEL

WEDNESDAY, 12 JUNE—MORNING, 9.30 to 12.30

Answer six questions from Part I and four questions from Part II.

You should not spend more than 45 minutes on Part I, leaving about 135 minutes for Part II.

PART I (120 marks)

Answer six questions. Each question carries 20 marks.

Write your answers in the spaces provided.

Keep your answers short.

Write your examination number at top.

Be sure to return this part of the examination paper; enclose it in the answer book you use for answering Part II.

1. Answer four of the following.

- (a) Name one substance transported in the phloem.....
- (b) The usual number of chromosomes in a human gamete is.....
- (c) What is the response of a root to gravity called?.....
- (d) Where would you expect to find bronchioles?.....
- (e) What do cells obtain from the conversion of ATP to ADP?.....

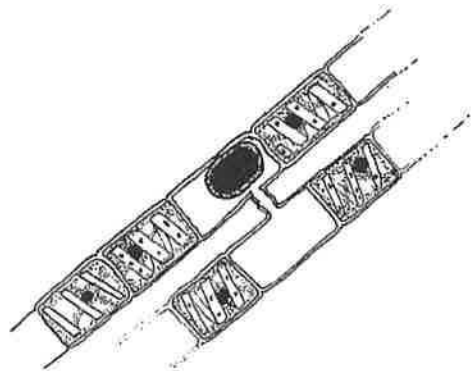
2. (a) Give two characteristics of the rabbit that enable you to classify it as a mammal.

- (i)
- (ii)

(b) Name the organism shown in the diagram.....

Give two features that enabled you to identify it.

- (i)
- (ii)



(c) The scientific name for the daisy plant is *Bellis perennis*.

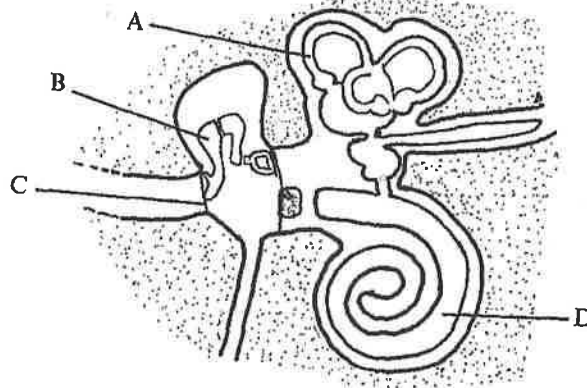
To which of the following does the name 'perennis' refer?

- | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| phylum | genus | family | species | variety |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

(d) Give one characteristic common to spiders, crabs and insects as members of the Phylum Arthropoda.

.....

3. Name the structures labelled A, B, C, D on the diagram of the ear.



A. B.

C. D.

State briefly

(i) the function of C:

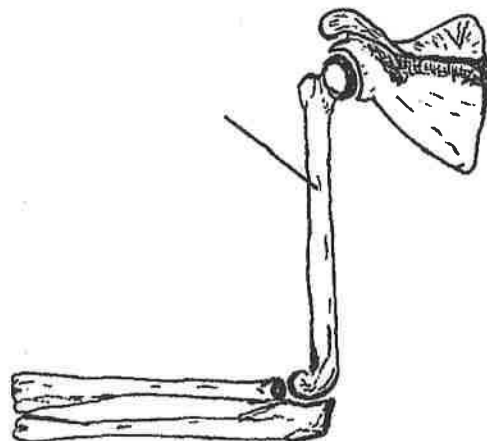
(ii) the likely effect of damage to A:

4. (a) Name the bone labelled X on the diagram of the arm.

.....

Draw in on the diagram the muscle and the tendons which lower the forearm.

Put the label Y on the tendons.



(b) State where the following are found in the mammal and give one function of each.

	<i>Location</i>	<i>Function</i>
Cerebellum:

Pelvic girdle:

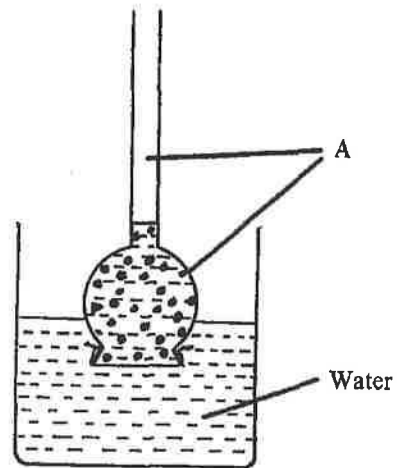
5. In an experiment, apparatus was set up as shown in the diagram.
Name the process being studied.

.....
What would you put in A?

.....
What would you expect to observe in tube A after a period of time?

.....
Explain the term semi-permeable membrane.

.....
State where the plasma membrane of the cell is located in a plant cell.



6. (a) In an experiment to find the percentage of water plus humus in a soil sample the following readings were obtained.

Mass of fresh soil at start of the experiment..... 200 g

Mass of soil remaining after heating strongly until all the humus was burned..... 132 g

- (i) What was the percentage of water plus humus in the original fresh soil sample?

.....
(ii) If you were carrying out this experiment how would you treat the soil to remove only the water?.....

- (b) The chemical symbols of a number of mineral elements present in soil are given below.

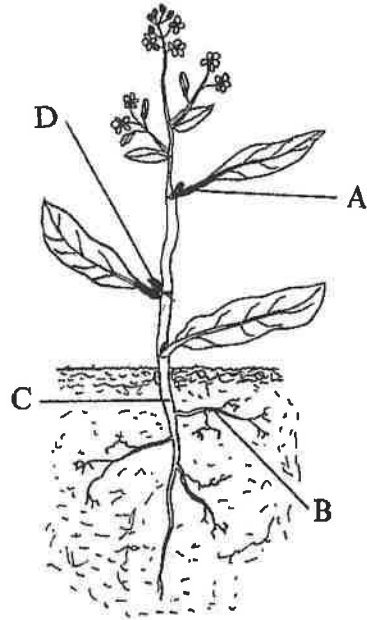
Fe Ca Mg Cu I

From this list select the mineral element essential for

- (i) bone..... (ii) haemoglobin.....
(iii) chlorophyll.....

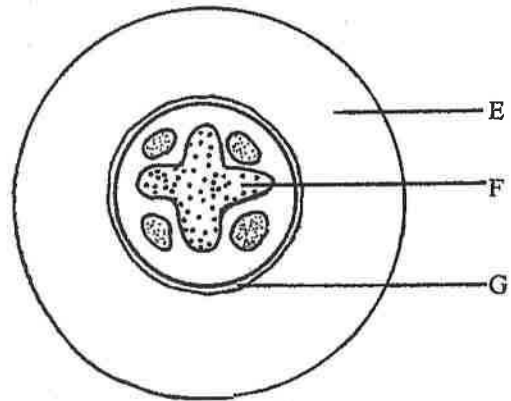
7. (a) Name the parts labelled on the diagram of a flowering plant.

- A
- B
- C
- D



(b) Name the parts labelled on the diagram of a transverse section through a root.

- E
- F
- G



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Part I is on a separate sheet which provides spaces for your answers. The completed sheet should be enclosed in your answer book.

PART II (280 marks)

Write your answers to this part in your answer-book.

Answer four questions. Each question carries 70 marks.

8. (a) (i) Explain the terms (a) producer, (b) consumer, as used in ecology. Distinguish between primary consumers and secondary consumers.
- (ii) In an experiment all the secondary consumers were removed from a habitat. Outline the effect this would have on the numbers of primary consumers *and* on the numbers of producers in that habitat.
- (iii) Write an overall chemical equation to show the process by which some of the radiant energy entering the habitat is trapped by the producers. State briefly why the number of steps or links in a food chain is limited, usually to four or five. (52)
- (b) A lawn, 50 m², was surveyed using a 1 m² quadrat to obtain an estimate of the number of earthworms in the lawn. The results are set out in the table below.

Quadrat Number	1	2	3	4	5
Number of earthworms	25	18	27	20	10

- Calculate (i) the average number of worms per quadrat,
(ii) the total number of worms in the lawn as estimated by this method.

State two ways in which earthworms are of importance in a habitat (18)

9. (a) Draw a large diagram to show the structure of *Amoeba* and label the following parts: contractile vacuole, pseudopodium, ectoplasm (plasmagel), endoplasm (plasmasol). (33)
- Outline how *Amoeba* obtains its food supply.
- (b) Answer the following with reference to *either* the moss *or* the fern.
- (i) Give a simple diagram of the sporophyte and label three main parts.
- (ii) What do the antheridia produce?
- (iii) Why is free water required for fertilization to be successful?
- (iv) Name the alternating stages of the life cycle. (37)
10. (a) Outline, with the aid of diagrams, the process of mitosis to show the stages prophase, metaphase, anaphase and telophase. (40)
- (b) In horses the allelic genes for coat colour, red (C^R) and white (C^W), are equally dominant and heterozygous horses are roan in colour.
- (i) Give the genotype of a red horse and a white horse.
- (ii) Give the genotype and phenotype of the progeny that would result from a cross between the red and the white horse (i.e. the F₁ progeny).
- (iii) For the cross F₁ × F₁ give the genotypes of the gametes and the genotypes and the phenotypes of the progeny in the F₂. (30)

11. (a) The diagram shows part of the digestive system of the human.

(i) State the meaning of the term digestion.

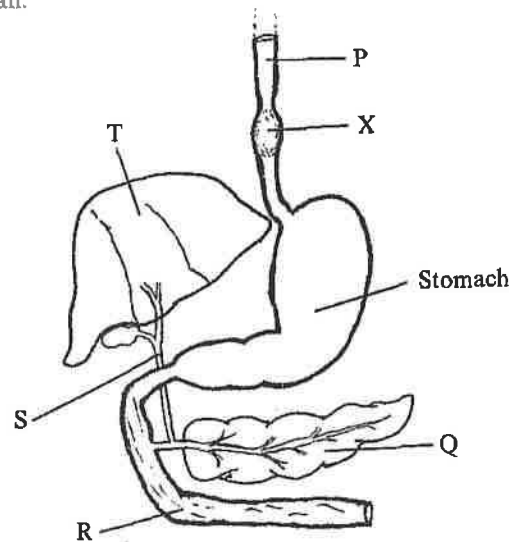
Name the parts labelled P, Q, R, S, T.

Name an enzyme and a hormone produced in organ Q and state the function of each.

(ii) The bolus of food X is moved to the stomach through tube P by peristalsis. What is meant by peristalsis?

Outline three things that happen to the food when it is in the stomach. (55)

(b) Describe briefly how you would carry out Fehling's test (or Benedict's test) and state the result you would expect to obtain when testing a solution of glucose. (15)



12. (i) List three ways in which water is important to all living organisms.

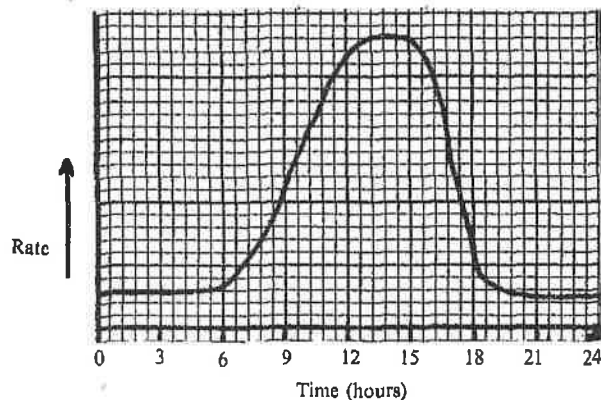
The graph shows the rate of transpiration during a single day (24 hours).

Explain the term transpiration.

Give the time, from the graph, during which the rate of transpiration was highest.

State two environmental conditions that would increase transpiration. (36)

(ii) Outline, with the aid of a diagram of the apparatus you would use, a laboratory experiment to measure the rate of transpiration. (34)



13. (a) Mammalian blood is composed of cellular components, platelets and plasma.

Name the two main cellular components and, for each type, state (i) where it is produced in the body, and (ii) a major function.

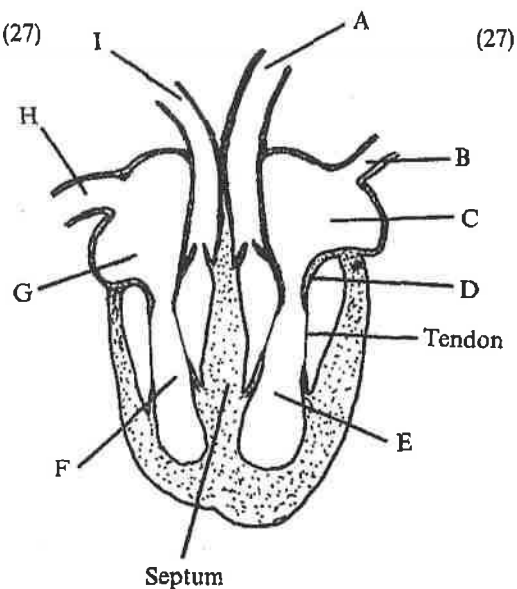
List three substances you would expect to find in plasma. (27)

(b) The diagram shows a section through a mammalian heart and some of the major blood vessels connected to it.

(i) Give the appropriate letter to indicate the location of the right atrium (right auricle) and the vena cava.

(ii) State to where the blood flowing through part A would be moving.

(iii) Name the part D and state its position (i.e. open or closed) (a) when the heart is filling with blood, (b) when the ventricle is contracting. (18)



(c) Describe, with the aid of a diagram, a laboratory experiment to show that exhaled air contains more carbon dioxide than inhaled air. Name the process by which the carbon dioxide passes from the blood capillaries to the alveoli. (25)

14. (i) State the meaning of the term saprophyte.

Give a labelled diagram to show the structure of the fungus *Rhizopus*.
Rhizopus is a saprophyte: state its role in the environment. (31)

- (ii) Describe a laboratory experiment to demonstrate the presence of micro-organisms in soil; include the precautions you would take to prevent contamination or infection and mention what you would expect to observe at the end of the experiment. (27)

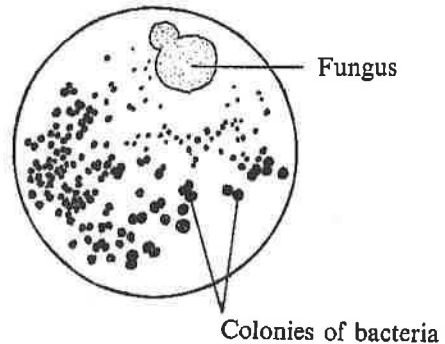
- (iii) In 1928 the discoverer of antibiotics, Sir Alexander Fleming, when growing pure cultures of the bacterium *Staphylococcus*, found that one of his agar plates of the bacterium was contaminated with the fungus *Penicillium notatum*.

The diagram is of a photograph of the contaminated plate.

(Note: At the start of the experiment the bacterial suspension had been spread evenly over the agar surface)

- (a) What observation can you make about the distribution of the bacterial colonies on the plate in relation to the position of the fungus?

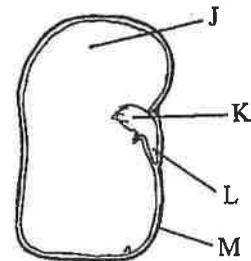
- (b) What deduction do you think Fleming made from his observation of this plate that resulted in the discovery of antibiotics? (12)



15. Answer *two* of the following.

- (a) The diagram is of a section through a broad bean seed.

- (i) Name the parts labelled and give one function for each of the parts J and L.
(ii) If you were given 100 bean seeds describe an experiment you would carry out to find the best temperature for their germination.



(35, 35)

- (b) Draw a diagram to show the structure of a neuron and label *five* parts.

State the function of a neuron and indicate how any *two* of its structural features are related to its function.

- (c) Describe, with the aid of a diagram of the apparatus you would use, an experiment to test the hypothesis that carbon dioxide is necessary for photosynthesis.

- (d) Define fertilization and state where it normally occurs in the reproductive system of the human female.

Implantation and placenta formation normally follow successful fertilization. Explain the underlined terms.

State briefly what happens to the uterus lining when fertilization does not take place.